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PROTECTION OF OLD-GROWTH FORESTS IN BRITISH COLUMBIA: A COMPARISON OF STATUTES, MANDATES, AND OBJECTIVES

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LITERARY

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CONTENTS

1. INTRODUCTION

2. OLD-GROWTH PROTECTION: DIVERSE OBJECTIVES

2.1 The Range of Objectives
2.2 The Spectrum of Human Interactions with Old-Growth
2.3 Compatibilities of Protection Objectives and Management Options

3.A REVIEW OF STATUTES AND MANDATES CONTRIBUTING TO OLD-GROWTH PROTECTION

3.1 Statutory Mandates
3.2 Other Mandates

4.SUMMARY OF CAPABILITIES OF PROTECTING OLD-GROWTH FORESTS

1. INTRODUCTION

The conservation of old-growth forests has recently gained considerable public attention in British Columbia. There has been a growing realization that, as a consequence of many decades of industrial use, few areas of such climax forests remain. Intense debate has emerged between the advocates of the protection of old-growth and those who are concerned with the effect of protection on the forest industry.

There are a number of agencies and statutes that either currently protect old-growth or are capable of providing protection to old-growth forests. These mandates differ significantly from one to another in their conservation approach and priorities and in their accommodation of levels and types of human interaction with the natural environment. This paper's fundamental purpose is to compare these statutes and mandates with respect to their capability of protecting old-growth, as distinguished from conventional forest management.

No judgement is made here on the issue of how much old-growth should be protected. Nor indeed is old-growth, as a concept, defined here. This document is intended to initiate discussion on such topics, not to propose solutions.

The statutes and mandates reviewed in this paper have each been devised for purposes that are broader than the issue of protection of old-growth *per se*. Consequently, each allows the responsible agency to approach this issue in a distinct manner. This institutional diversity is compounded by the range of objectives that society may have for protecting old growth forests.

As statutes are founded upon society's objectives, and as each statute authorizes an agency to manage resources in specific ways, it is useful to commence this analysis by defining a representative range of objectives for protecting old-growth, and then comparing the compatibilities of these to a spectrum of management options, from total protection to total utilization. This comparison, as presented in section 2, is important analytical background for review, in sections 3 and 4, of the pertinent statutes and mandates.

2. OLD-GROWTH PROTECTION: DIVERSE OBJECTIVES

Old-growth forests [1] in British Columbia offer ecological, environmental, educational, recreational, research, economic, historical, and spiritual values to society. These values are not necessarily mutually exclusive; in fact they may be strongly interdependent. There are even indications that the long term sustainability of successional stage commercial forestry may ultimately depend upon the effective preservation of forest biodiversity that is achieved through old-growth protection.

Whether recognized formally by statute or by our society in a less legalistic or formal manner, there are several rationales which lead either directly or indirectly to the need to protect old-growth. These can be viewed as existing or potential objectives for the protection of old-growth, which may or may not be within the mandates of statute-empowered agencies and other public and private organizations. Furthermore, each agency with at least a theoretical interest in old-growth protection for one or more objectives may consider certain activities to be acceptable or not acceptable. Therefore, as a prelude to examining the existing mandates of agencies, it is valuable to describe the range of objectives for protecting old-growth and to consider the relative compatibilities of these objectives with the spectrum of uses that may occur in old-growth forests.

2.1 The Range of Objectives

The following eleven objectives are the author's interpretation of the major rationales protecting old-growth forests. These have been derived through discussion with a variety of resource management professionals and by review of the literature. They are presented only for discussion as representative of the actual objectives that society may set for itself.

(a) Representative Ecosystem Preservation:
The protection of ecologically viable samples of representative old-growth forest ecosystems and communities, free from human disturbances or alterations, is an objective intended to ensure that the biodiversity and gene pools of these stable, climax associations are protected, at least at a minimal level. This is important from both an ecological perspective, in terms of the

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[1] The writer has used this concept to refer to ecologically stable climax forest conditions in British Columbia that have not been significantly altered or disturbed by human activity in the last 150 years.

perpetuation of stable natural systems and their contribution to climatic stabilization, and from an anthropocentric perspective, in terms of the scientific, educational, and economic values to be derived from safeguarding forest ecosystems as storehouses of untapped information.

Under this objective, it is appropriate that there is an effective sampling of each type of old-growth forest. Not only must the individual representative sites be of a size and configuration so as to maximize the likelihood of long term stability, but also it is necessary to replicate this sampling. Geographically separate sites of the same forest type substantially increases the long term viability of the samples and better distributes the ecological benefits to adjacent areas disturbed by human activities. The methods for selecting adequate samples is under increasing scrutiny, especially with regard to the problem of fragmentation of ecosystems into isolated, protected "islands" that may not be viable or sustainable in the long term ecological perspective.

(b) Preservation of Special Flora and Fauna:
To the extent that certain species or communities of fauna or flora associated with particular old-growth forests may be unusual, rare, or endangered, it is appropriate that society take care to protect the habitat or locale of identified populations. Protection of these special ecosystem elements is critical wherever they happen to be found. Whether the tree species themselves, or other plants or animals dependent upon the old growth forest are ecologically special, protection will require that a viable, adequately buffered segment of the forest be set aside from all forms of disturbance. While such protection is generally recognized to be of ecological and scientific importance, it can also prove to have potential commercial and economic importance, as for instance in the harvest of valued wild mushrooms or plants that offer desirable pharmacological properties.

(c) Protection of Associated Wildlife Habitat:
Some old-growth forests, particularly those with a dense, high canopy offer special types of habitat to wildlife. For example, ungulates such as deer, elk and caribou shelter and feed in old-growth stands during winter. Some bird species, such as the spotted owl in the southern interior and the marbled murrelet on the west coast are ecologically dependent upon certain old-growth forest types.

To protect the occurence of or the population levels of such forest dependent wildlife species, it is necessary that there be a suitable level of well distributed old-growth forests. In some

circumstances, it may be possible to carry over some old-growth wildlife habitat characteristics to second growth, but this requires further study. Regardless, the objective of optimizing wildlife habitat must be factored into forest use decisions.

(d) Protection of Freshwater Fish Habitat:
Old-growth forests are important for fish habitat as they have a stabilizing influence on stream flow, they yield very high quality water, and they contribute large organic debris in suitable quantity such that stream habitat is increased and diversified. Moreover, stream habitats are particularly sensitive to roadbuilding, adjacent clear cutting, and bridgebuilding. Consequently, the protection of old-growth forests along streams of significant or potential fish habitat is an important fishery conservation objective.

(e) Provision of Opportunities for Nature Conservation Research:
As climax ecosystems, old-growth forests offer opportunities for benchmark research not available elsewhere. Research is necessary to develop a better understanding of the dynamics and maintenance of old-growth, as well as for the discovery of useful information for the applied sciences. It is therefore a desirable to ensure, by the protection of viable samples of old-growth forests, that sufficient opportunities are provided for the scientific community.

(f) Provision of Opportunities for Education:
Old-growth forests offer superb, inspirational opportunities for both formal and informal education regarding the principles of ecology and as examples of undisturbed environments. It is an appropriate objective that sufficient old-growth, in proximity to populations and access, be available for use as outdoor classrooms.

(g) Opportunities for Forestry Research:
The applied science and professional practice of forestry is based upon the perpetuation of forests as a renewable resource. While the harvesting of old-growth has been the foundation of the forest industry in this province for over a hundred years, much remains unknown about the ecological dynamics that produce and sustain old-growth.

Furthermore, old-growth forests may contain extremely important genetic information that may be required for the practice of intensive forestry on other lands. In addition to ecological change induced by human activities, climatic change also must be considered, and in this light it is likely that only those climax forests that are ecologically resilient may persist. The fostering of ecologically sustainable timber management may

depend ultimately on the retention and study of undisturbed old-growth forest ecosystems.

The facilitation of forestry research, for the benefit of industry and of society, requires that sufficient, viable stands of each type of old-growth be protected. It is noteworthy that forestry research may require levels of manipulative experimentation and extraction of genetic materials beyond those of benchmark and background ecological studies.

(h) Opportunities for Outdoor Recreation:
The public's need for varied opportunities for enjoyment of leisure time in the outdoors is a well established characteristic of our society. Protection of old-growth forests suited to public visitation can afford attractive settings for enjoying the outdoors.

Old-growth forests are particularly attractive for sightseeing and photography, informal nature appreciation, hiking, camping, fishing, and hunting. These diverse activities place different demands upon the forest setting; it is important that specific recreational uses of old-growth be directed to areas best suited to sustaining such types and levels of use. This applies to both intensive, road accessible activities and to dispersed, wilderness-oriented activities.

(i) Tourist Destination Opportunities:
Tourism is a market-oriented economic activity in which people expend capital away from home in order to enjoy sights and activities that they view as special. The grand, tall trees of some old-growth forests are significant tourist attractions and therefore localities that can offer this kind of feature will obtain the economic benefit of increased tourist visitation. The preservation of tall stands of old-growth therefore can serve the objective of enhancing the tourism industry.

Providing opportunities for tourists to view tall trees often necessitates a relatively comfortable level of access and on-site facilities, but this is not universally the case. Although the number of visiting tourists drops rapidly with decreasing ease of access and degree of facilitation, expenditure levels per person rise inversely, as people are prepared to pay more for experiences of greater exclusivity.

(j) Spiritual and Aesthetic Values and Opportunities:
Beyond outdoor recreation or tourism, there are deeper levels of inspiration, spirituality, and aesthetic appreciation within the human psyche that can be awakened through contact with elements of nature of extreme beauty, rarity, and magnitude. Old-growth

forests, particularly those featuring tall and large diameter trees and those that signify undisturbed wilderness, offer the public the kind of experience that is of high appeal on religious, artistic, or emotional grounds. In this way preservation of old-growth forests can add considerably to our culture's richness.

(k) Archaeological and Historical Values:
Some old-growth forests bear evidence of use and occupation by aboriginal peoples in ancient times. It is well recognized by this society that it is important to protect such archaeological evidence in order to permit careful study and to enhance contemporary knowledge of these earlier cultures.

In a historical context, the European-based culture of North America has made considerable economic use of the old-growth forests; they have been the foundation of the forest industry and have yielded the lands for agriculture and settlement. Today, the remaining old-growth forests represent the historical vestiges of forests that only a hundred years ago dominated much of the Province. Therefore, protection of old-growth forest stands contributes to the objective of protecting examples of our history and of the history of earlier cultures.

(l) Conservation of Water Resources:
Old-growth forests, as climax ecological regimes, are very highly stable. This stability is essential for the protection of water supplies of high quality and dependable flow, both for fish and wildlife habitat and for human consumption. Diminishing quality and availability of freshwater is a major environmental issue throughout the world, including in many parts of Canada. Those settlements that have large protected aquifer and watershed areas are increasingly the exceptions. The protection of old-growth forests from major environmental disruption can contribute considerably to the conservation of water supplies.

2.2 The Spectrum of Human Interaction with Old-Growth

Society interacts with and affects old-growth forests in many ways and degrees. At one extreme, it is society's option to protect old-growth from all man-caused physical impact. At the other, as a consequence of other socio-economic priorities, our society may eliminate old-growth. Within this spectrum, are the assorted human activities that may conceivably occur in association with old-growth.

The following list, while not exhaustive, is intended to illustrate this variety of options available, and leads to the compatibility evaluation of Section 2.3. It should be noted that the precise order of these "management options" for old-growth depends greatly upon the level of intensity exercised within each.

TABLE 1

Management Options

PROTECTION	1	Absolute Nature Sanctuary
	2	Observational research/study
	3	Dispersed recreation/public visitation.
	4	Wild foods gathering.
	5	Manipulative research.
	6	Genetic materials extraction.
	7	Intensive recreation.
	8	Mineral and other geophysical surveys.
	9	Roads and roadbuilding.
	10	Dispersed habitation (eg.cottaging).
	11	Selected cut forestry.
	12	Rotational clear cut forestry (with old growth islands remaining).
UTILIZATION	13	Total forest removal (eg. agriculture, settlement, large scale clear cut forestry).

2.3 Compatibilities of Protection Objectives and Management Options

The statutes and agency mandates examined in section 3 of this paper each offer distinct objective-based means of protecting old-growth forests, each in combination with a set of management options. Therefore the following assessment of the varying compatibility of the management options with the protection objectives, as presented in Table 2, serves as useful background.

TABLE 2

PROTECTION OBJECTIVES	MANAGEMENT OPTIONS (see Table 1) 1	2	3	4	5	6	7	8	9	10	11	12	13
Ecosystem Preserv.	H	H	H	M	M	M	L	L	L	0	0	0	0
Special Flora & Fauna	H	H	M	L	L	0	0	0	0	0	0	0	0
Wildlife Habitat	H	H	M	M	M	L	L	0	0	0	L	M	0
Freshwater Fish Habitat	H	H	H	H	M	H	M	M	L	H	M	L	0
Nature Conservation Research	H	H	H	M	M	M	L	M	L	M	L	0	0
Education	L	H	H	H	H	H	H	M	M	M	M	L	0
Forestry Research	L	H	H	H	H	H	M	M	M	M	L	L	0
Outdoor Recreation	0	H	H	H	M	H	M	L	M	M	M	0	0
Tourist Destination	0	H	H	H	M	M	H	L	M	M	L	0	0
Spiritual/Aesthetic	M	H	H	H	M	M	M	L	L	M	L	0	0
Historical & Archaeological	H	H	H	M	M	M	M	L	L	M	L	0	0
Water Resources	H	H	M	M	M	M	L	L	L	L	L	0	0

Table 2 compares each of the prime motivations for setting old-growth forests aside to their relative suitability to the range of management options. It shows how protection objectives are related to management. For example, supposing that an area is set aside to protect "critical wildlife habitat", the table suggests the levels of compatibility (or acceptability) for the various levels of human interaction that might occur in that area. "H" represents high compatibility; under normal conditions no significant conflict is likely. "M" signifies a moderate level of compatibility; there might be some impacts or conflicts but careful management should be able to sort them out. "L" stands for low compatibility; the interaction could be tolerated but there is a strong likelihood of conflict and deleterious impact, not all of which could be resolved through management. Finally, "0" signifies that there is a fundamental and direct conflict between the protection objective and the particular type of human interaction or management option.

It is emphasized that this compatibility assessment is theoretical, generalized, and is presented here for discussion purposes only. These assessments are the author's perceptions. The fundamental message is that compatibilities vary considerably.

Despite its limitations, this table illustrates that:

(a) there are significant differences among old-growth protection objectives in their tolerances for various human activities;

(b) it is unlikely that a single mandate for old-growth protection, in tending to favour a limited subset of the society's protection objectives, can be expected to fully satisfy the need for protection of old-growth forests;

(c) some old-growth protection objectives share compatibilities with the range of management options, and in such cases there may be a single type of designation that can serve multiple objectives;

(d) old-growth protection objectives appear to share a fairly common tolerance (moderate to high in most instances) for those management options that avoid the extremes of total preservation and total utilization; and

(e) fewer old-growth objectives are compatible with increasing levels of landscape modification or utilization.

3. A REVIEW OF STATUTES AND MANDATES CONTRIBUTING TO OLD-GROWTH PROTECTION

The following statutes and mandates are each related to a select set of the protection objectives discussed in Section 2. Moreover, each is differently tolerant of or likely to encourage a particular series of human interactions or management options for lands managed under its authority. Consequently, this review shows the adequacy and limitations of old-growth protection under the various jurisdictions currently available.

3.1 Statutory Mandates

(a) Canada Wildlife Act

The purpose of this statute is to enable the federal government, under the authority of the British North America Act, to work with other governments in Canada and with private agencies to conserve wildlife and wildlife habitat. This statute is distinct from the Wildlife Act (B.C.).

The Canadian Wildlife Service is the federal agency responsible. By agreement, the Wildlife Branch of the B.C. Ministry of Environment cooperates in the implementation of this Act.

Section 10 of this Act allows for the designation of National Wildlife Areas (N.W.A.'s). These tend to be sites that are either purchased by or gifted to the Federal government. In association with Provincial reserve lands, such areas are established for research, conservation and interpretation of migrating birds and, by agreement with the Province, other wildlife. Such a designation allows for various levels of scientific research and non-disruptive public visitation, with road access and developed interpretation facilities.

This designation could be applied to an area of old-growth provided it featured significant habitat for migrating birds, such as the marbled murrelet. The existing N.W.A's appear to favour wetlands and associated upland areas. As a further consideration, the application of this designation is limited by the willingness of the Federal government to acquire a site, often from private ownership.

(b) Ecological Reserves Act (B.C)

This statute was passed in 1971 to permit the Provincial Cabinet to reserve public lands for ecological purposes. The Act specifies the reservation of land for five purposes:

(i) areas "suitable for scientific research and educational purposes associated with studies in productivity and other aspects of the natural environment;"
(ii) areas "that are representative examples of natural ecosystems within the Province;"
(iii) areas "that serve as examples of ecosystems that have been modified by man and offer an opportunity to study the recovery of the natural ecosystem from modification;"
(iv) areas "where rare or endangered native plants and animals in their natural habitat may be preserved; and"
(v) areas "that contain unique and rare examples of botanical, zoological or geological phenomena." (R.S.B.C. 1979, Chap.101, p.1)

The administering agency is the Ministry of Parks. The mandate to set aside representative ecosystems is implemented around the concept of climax vegetative communities, which, in forested regions, means that there is pronounced focus upon protecting representative old-growth forests. Under this statute, old-growth may also be protected if it is considered to be outstanding, unusual, or rare; thus a stand of the tallest trees, of the oldest trees, or of an unusual species occurence might be considered a candidate. Based upon these purposes, this Act is well suited to the protection of old-growth forests for scientific and educational purposes.

In general, recreation visitation is not encouraged, although casual non-consumptive visitation is allowed at many sites. Such use is not permitted at any sites considered too sensitive. Other uses are prohibited totally.

There are over one hundred ecological reserves in the province. Although many are comparatively small sites, about half contain old-growth forest areas ranging from 10 to over 3,000 hectares. At least three major coastal ecological reserves (V. Krajina, East Redonda, and Gingietl Creek) protect significant old-growth forest areas (Roemer, pp.147-148). The establishment of new ecological reserves is somewhat constrained due to the requirement of consensus among the other resource management agencies, while the presence of major commercial resource values tends to make consensus difficult.

(c) Environment and Land Use Act (B.C.)

This statute was created in the early 1970's to coordinate decision-making on matters affecting land use, land allocation and environmental issues. It empowers Cabinet to make orders and regulations on any such matter, provided it is within the jurisdiction of the Province. Early in its history, this statute was used to reserve one area as a "Wilderness Conservancy", which is defined as:

> "an expanse of natural environment which contains outstanding or representative examples of scenery and natural history uninfluenced by the activities of man, and which is particularly suitable for extensive primitive recreational use." (B.C. Min. of Lands, Parks and Housing, p.18)

To date, the only case of this type of designation is the Purcell Wilderness Conservancy, established by Order-in-Council and consisting of roughly 130,000 hectares. This reserve is administered by the Ministry of Parks in a manner similar to wilderness-oriented provincial parks. Only recreational, educational and scientific uses are considered appropriate at this time. There is general uncertainty over whether this area is a de facto park, whether it offers superior protection to a park, or whether, by not being a park, the opportunity for resource development remains open.

The concept of "wilderness conservancy" could be applied elsewhere in the Province, and could be suited to protecting old-growth. However, with the advent of wilderness areas under the Forest Act and with the uncertainties of the former type of designation, this seems unlikely, particularly in areas of significant commercial timber value.

(d) Fisheries Acts (B.C. & Canada)

Both the province and the federal government have fisheries acts. Jointly these protect and allow management of fishery resources. Fish species are the responsibility of the federal government (Department of Fisheries and Oceans). The province is responsible for the substrate (stream beds, foreshore, etc) upon which many of the fisheries are located. Provincial management responsibilities are divided between commercial and recreational orientations. Respectively, the responsible agencies are the Ministry of Agriculture and Fisheries, Aquaculture and Commercial Fisheries Branch and the Ministry of Environment, Recreational Fisheries Branch.

These statutes, especially the federal Fisheries Act, give a very high degree of authority to protect fish and fish habitat, especially to species of sport and commercial significance. With regard to fishery resources in forested areas, greatest concern lies with the effects upon stream flow, turbidity, and the disruption of stream channels, pools, and spawning beds. As a consequence, various management regulations and guidelines have been developed to reduce the impacts of forestry and other industrial activities on such fisheries. Among these are restrictions on bridgebuilding as well as on roadbuilding and forest cover removal adjacent to streams. While protection of forest stands paralleling streams appears to be a priority, seldom do the agencies totally prohibit industrial activity in a given area. Nevertheless, such regulatory measures indirectly help protect certain portions of old-growth forests, particularly in coastal regions and in association with salmonid productivity.

(e) Forest Act (B.C.)

This statute is the vehicle by which the Province administers and manages the use and allocation of crown-owned forests and forestlands, as well as regulates the forest industry. The agency responsible is the Ministry of Forests. The Forest Act not only guides the use of timber resources, but also the Ministry is charged with the responsibility to ensure that livestock grazing on crown land is managed and that other public interests in forestlands are provided for. Sections 3 and 4 specify that the Chief Forester shall assess and classify lands that are best suited to providing forest oriented recreation, wilderness oriented recreation, and conserved wilderness.

Sections 52 and 53 allow the Minister to make withdrawals from a crown land forest tenure for any purpose other than timber production. The tenure holder is entitled to compensation only for that amount withdrawn that causes a reduction in the annual allowable cut of more than 5%. Once withdrawn, such lands could be designated under any land-based statute. In principle, this measure could be used to retain a percentage of old-growth from harvesting.

The Act also enables the Minister to designate recreation sites and trails on forestlands (Section 104). While there is no statutory definition of the kind of site that is suited to recreation, the Act specifies that such designated sites and trails must not be subject to forest cutting rights, timber

sales, grazing rights, and other interests in land as may be allowed by the Land Act. Presumably this provision could allow the designation of small, accessible old-growth sites that are of high public appeal.

The Forest Act has recently been amended to include the designation of "Wilderness Areas". These are intended to be extensive areas wherein commercial logging is not permitted and wherein any other uses deemed inconsistent with the preservation of wilderness may not be permitted (R.S.B.C., Chap.140, Sec. 5.1). Currently, three such wilderness areas have been established, but the policy which would guide their selection and management has yet to be finalized and approved.

In principle, wilderness areas under this Act could protect old-growth forest. Compatible uses would include various levels of research and dispersed levels of public visitation for educational and recreational purposes. It is also conceivable that such areas could be sources of tree seed and that dispersed wild food gathering would be acceptable. There has been criticism that such wilderness areas would have little assurance of permanence and that it is unlikely that mining activities would be excluded.

(f) Greenbelt Act (B.C.)

This statute was intended to guide the Province's acquisition and reservation of lands suited to the purpose of greenbelts. Although the Act does not precisely define the concept, it is generally recognized as referring to lands surrounding or surrounded by urban development, which have been retained in a vegetated condition. Its impetus when conceived was to protect visual and other aesthetic qualities from boundless urban sprawl.

The Ministry of Crown Lands is responsible for this statute. The usefulness of this statute is constrained by the limited availability of crown lands in the path of urban development, by the high cost of acquiring significant areas of such lands that might be desirable as greenbelt and by the lack of a fund to acquire lands. The original fund was expended over a decade ago. The Ministry has recently been reviewing existing green belt lands to determine whether they should remain as greenbelt, be given a more appropriate designation, such as under the Park Act, the Park (Regional) Act, or the Wildlife Act, or be available for general disposition.

In any event, the Act's potential applicability to protecting old-growth is greatly limited by the fact that undisturbed old-growth forests in the vicinity of urban areas are virtually non-existent, except perhaps in very isolated small patches in existing, long established parks.

(g) Heritage Conservation Act (B.C.)

This statute fosters the protection and conservation of heritage properties and resources. The term "heritage" refers to manmade and man-affected natural elements that are of historic, architectural, archaeological, paleontological or scenic significance to the Province or a municipality.

Responsibility lies with the Cultural, Recreation and Historic Resources Department of the Ministry of Municipal Affairs, Recreation and Culture. Under this statute, sites of archaeological significance defined under Section 6 of the Act are automatically protected from uncontrolled disturbance, wherever they occur; special designation is not required. Other sites or features of heritage value must be separately designated as a "heritage site", based upon the discretion of the Minister or of a municipal council.

Insofar as aboriginal peoples, prior to caucasian colonization, may have utilized or inhabited certain old-growth forest areas, such sites may be of archaeological significance. The clearest example of this is the occurrence of trees that have been used as living sources of bark and planks; some such trees occur within recognized archaeological sites on the coast of British Columbia. In this scenario, this statute could afford protection to portions of the forest where archaeological sites recognized by this statute are found. However, this would not necessarily result in the protection of an ecologically viable sample of such an old-growth forest. Furthermore, this statute is intended to allow for the controlled, scientific extraction of information from archaeological sites. With trees, this may mean that, for instance, a selection of "culturally modified" trees might be purposefully dissected in order to learn as much as possible about the people who once utilized them.

Beyond archaeological sites, it is conceivable that ancient forests may of themselves be considered by the public to be heritage resources in that the harvesting of old-growth has traditionally been an economic mainstay of the economy and that old-growth is comparatively scarce in modern times. However, authorities on the application of this statute feel

that it is best limited to manmade and man-affected elements, and that undisturbed, remnant natural areas are more appropriately dealt with by mandates oriented to the natural environment.

(h) Land Act (B.C.)

The Land Act provides for the administration and allocation of provincial Crown lands for development, recreation, and conservation purposes. A number of sections of this Act enable the Minister or the agency to reserve Crown lands from disposition or allocation, or to control the type of use that may occur on a given land parcel. Also, the Land Act is the only statutory vehicle the provincial government has that enables the negotiation of land exchanges and acquisitions involving the private sector.

In applying reservations, the Ministry of Crown Lands usually acts on behalf of or at the request of other crown agencies. Sections 11 and 12 define the use of Order-in-Council Reserves and Map Reserves. The former requires endorsement by Cabinet, while the latter is an administrative tool available to regional land directors and is therefore more readily applied and removed. Reserves may be more specifically classified in relation to their primary purpose -- eg. "Use, Recreation & Enjoyment of the Public Reserve"; "Wildlife Management Reserve". Under Sections 13 and 61, the Minister may designate a specific use or prohibit a use or uses in a specific area.

Notations of interest are established by policy rather than by statute and serve to record on Ministry status maps the interest of an agency over a particular area of crown land. This mechanism ensures that the interested agency will receive a referral of any application to use that area of crown land.

In these ways this statute may be used to reserve forest lands, provided such is requested by the Minister of Forests. The Minister of Crown Lands can be, therefore, a facilitator of the conservation objectives of other agencies. Under Section 101, land may be transferred by Ministerial order to another agency, such as the Wildlife Branch or the Ministry of Parks.

By these mechanisms, the Land Act can be applied toward the protection of old-growth forests. Although it is unlikely to be the preferred or the sole instrument of protection, a reservation, map notation, designated use, or prohibition of use is likely to be among the first steps toward a more

formalized level of protection. Reservation, being at the request of another crown agency would entail a special purpose, such as recreation, ecological research, or wildlife management, which in turn would indicate which specific other uses may be permitted or disallowed.

(i) Migratory Birds Convention Act (Canada)

The purpose of this Act is to apply a convention between the United States and Canada regarding the protection of migratory birds. In Canada, the Canadian Wildlife Service is the responsible agency.

Section 4 allows for the designation of "Migratory Bird Sanctuaries". These are few in number and they tend to be created in wetland areas where concentrations of migratory birds occur. Old-growth forests are unlikely to be protected to a significant degree by this mechanism or this statute.

(j) National Parks Act & West Coast National Park Act (Canada)

The National Parks Act enables the establishment and management of national parks and national park reserves. The one exception in British Columbia is Pacific Rim National Park which is created and defined by the West Coast National Park Act.

National Parks and Reserves are the responsibilities of Parks Canada. These statutes give the strongest level of protection to designated areas for wilderness, public recreation, wildlife conservation, and related uses. Mining, forestry and other non-recreational, extractive and industrial activities are excluded, as is private ownership, except in certain accepted enclaves.

Generally wilderness zoning dominates much of the land area, allowing for dispersed, controlled recreational visitation and other compatible, usually non-consumptive recreation. Intensive recreation, accompanied by roads and other developed facilities, occurs in a small percentage of the land area as most of the six areas set aside under these statutes in British Columbia. The five national parks total approximately 470,000 hectares. Recently the South Moresby area (144,000 ha.) of the Queen Charlotte Islands has been established as a National Park Reserve. This is an interim step pending resolution of conflicting alienations, land uses, native land claims and other land issues.

These statutes are responsible for protecting significant old-growth areas, particularly on the outer west coast (Roemer, et al., p.148) and possibly in the Columbia Mountains. It is suspected but not verified that much of the forest cover in the national parks of the Rocky Mountains is comparatively recent due to large scale wild fires in the last century and the early 1900's.

The further application of these statutes in British Columbia is subject to agreement between the federal and provincial governments. This is a major impediment to the establishment of new parks and to additions to existing parks. A further constraint is the necessity to eliminate all private rights and land tenures; while this improves the level of protection, it is a very costly measure that results in a protracted and conservative decision-making process.

Beyond seeking and managing national parks, Parks Canada also identifies significant natural sites across the country as "Natural Areas of Canadian Significance". This is primarily an inventory program. Its merit for old-growth protection lies in the value of "red flagging" special natural sites, and thereby bringing greater attention and interest to their protection. In addition, Parks Canada has devised a "Canadian Natural Heritage Sites" program. This appears to be intended to include important areas that have been protected by various levels of government and statutes in a broader system of significant areas. So far however, this program remains in the conceptual stages. Theoretically, old-growth sites of great public or scientific interest would qualify for either of these two programs.

(k) Park Act (B.C.)

This statute provides for the establishment and management of provincial parks and recreation areas. This is the responsibility of the Ministry of Parks, which considers its mandate to include providing for both public outdoor recreation and nature conservation.

Provincial Parks may be of Class A or Class B status. The former is well secured from non-recreation use or development. When large natural or wilderness areas are encompassed, these parks carry an important conservation value. Class A parks for which satisfactory boundaries have been achieved are described in Schedule A of the Act, and consequently are less likely to be reduced in size in the future.

Class B status allows for the existence of certain non-conforming uses under permit, based on the decision of the Minister. Today Class B parks are practically non-existent; most have already been converted to Class A or Recreation Area status. Recreation Areas, like Class B parks, allow specified non-conforming uses to persist. Often such uses are restricted in areas and/or level of impact, such that recreation and conservation values are protected in the majority of the designation. Recreation Areas may be upgraded to Class A status once all non-conforming tenures have been eliminated.

The Park Act also defines "Nature Conservancy Areas" (N.C.A.'s). These are designated by Order-in-Council as roadless tracts within Class A parks and are, in theory at least, given special protection and management to ensure that non-conforming uses do not occur and that even recreational visitation has a minimal impact upon ecological values.

In general, these designations are all useful for the protection of old-growth forests. Greater size, statutory boundary definition, Class A status, and N.C.A. status are preferred conditions for greater protection. The Park Act, like the Ecological Reserves Act, overrides most other provincial resource and land use statutes, and therefore designated areas of any size or classification can be effectively protected through vigilant management.

Specific initiatives of the agency relevant to old-growth are the protection of "special natural features" and "representative landscapes". In the former, the goal is to set aside outstanding natural features for their conservation and for public outdoor recreation enjoyment and education. This may include a highly accessible forest such as Cathedral Grove (MacMillan Park). The representative landscapes initiative is designed to include in the park system large scale areas that contain the typical patterns and associations of the regional natural landscapes of British Columbia. Undisturbed wilderness areas are encompassed in this way.

While the Park Act is responsible for protecting much of the old-growth that has already been set aside, this statute's value for preservation of natural sites is somewhat constrained by its dual conservation/recreation mandate. Particularly in small and accessible areas, recreation interests can dominate to the possible detriment of old-growth. For instance, in Manning Park, roads were constructed within Sumallo Grove in order to facilitate picnicking; there is concern that these roads may contribute to tree mortality.

Also, in high use areas, control of tree hazards to people is a management priority and therefore old growth stands may be radically or gradually altered in the interests of public safety.

(l) Park (Regional) Act (B.C.)

This statute permits a regional district to add to its statutory responsibilities the ability to acquire and manage parks and trails. The designations available are Regional Park and Regional Trail. Not all regional districts have taken advantage of this statute, and in those that have, most designated areas are relatively small and tend to be devoted to medium and high density recreation. There are some larger regional parks -- eg. East Sooke in the Victoria area, and the "Endowment Lands" near the University of British Columbia -- but old-growth is rare even in these.

It is possible for a regional district to protect an old-growth stand or forest through the designation of a park, should such a stand exist in proximity to urban development and should the regional district possess the resources to acquire it. However the level of protection, in comparison to that afforded by other statutes and mandates, is not high, being largely determined by bylaw or management plan rather than the strength of or the exclusiveness of the statute itself.

(m) Water District Acts (B.C.)

For three municipal areas -- Victoria, Vancouver, and Nanaimo -- separate statutes exist that define water districts for each. These Acts empower appointed boards to acquire, secure, and supply potable water for urban use. As a consequence, these semi-autonomous authorities are responsible for the management of large tracts of land that have been reserved almost exclusively for the protection and the supply of clean and pure water for these cities.

These water districts potentially offer protection to ecological values contained therein, including any existing old-growth. As old-growth in these coastal biogeoclimatic zones represents a stable, climax vegetative condition, the retention of remaining old-growth adds stability to water and stream flows through those forests.

The water district boards have exclusive powers within the water districts, except where there are pre-existing private rights and tenures. It is within their management authority to determine how the land should be best managed to protect the water supplies. A case could be made for their formal recognition of the value of protecting old-growth based on this being a fully compatible objective.

(n) Wildlife Act (B.C.)

The Wildlife Act deals with the province's conservation and management of wildlife. This statute is administered by the Wildlife Branch of the Ministry of Environment.

Three land designations are defined within the statute that have possible relevancy to protecting old-growth. A "Wildlife Management Area" is any area designated as such by Order-in-Council for the special management of wildlife, including the protection of habitat. A "Critical Wildlife Area" and a "Wildlife Sanctuary" are special zones within a wildlife management area and are designated by the Minister in accordance with the needs of endangered or threatened species or other wildlife habitats. It is noteworthy that these designations, which may only be applied in areas under the jurisdiction of the Ministry, are comparatively experimental at this time, as only a few have as yet been created.

To the extent that old-growth forests can be critical wintering areas for ungulates and may be the special habitat for certain rare birds and other animals, there may be consideration by the Wildlife Branch to seek protection of percentages of old-growth both by dedication of wildlife management areas and by management guidelines to the forest industry. However, the application of any such designations or other regulatory measures designed to protect wildlife amid old-growth may be quite flexible, and adjustments may be made over time that are appropriate to wildlife and forest harvesting objectives but contrary to protection of old-growth. For instance, it is conceivable that for wildlife purposes it may be satisfactory to substitute second growth for old-growth, once a certain age/height class has been exceeded, provided the amount and quality of habitat does not diminish over the rotational cycle.

The Wildlife Branch accepts that uses other than wildlife conservation will be accommodated where they are compatible with or complimentary to fish and wildlife management. (Min. of Environment, 1989). In general, dispersed recreation and

most forms of nature-oriented research and study would be compatible within wildlife management areas. Such activities would likely be restricted from wildlife sanctuaries and critical wildlife areas. Presumably, non-conforming uses would likely include industrial uses, roadbuilding, and any other potentially disruptive activity including intensive recreation; the implications for these uses in each areas would have to be carefully considered on a case-by-case basis.

While not directly attuned to old-growth protection, this statute has significant capability to protect those values of old-growth that are important to wildlife.

3.2 Other Mandates

Although not directed by statute, some agencies have a special interest in protecting old-growth that is relevant in this discussion. This list includes non-government agencies that specialize in funding the acquisition of natural lands for conservation purposes.

(a) Ministry of Tourism (B.C.)

This agency is primarily concerned with the development and marketing of British Columbia as a tourist destination. In recent years it has become increasingly attuned to the idea that much of this province's competitive advantage lies in its ability to offer natural scenery and outdoors experiences to visitors. Therefore the ministry is now interested in the protection of resources that are likely to be of interest to tourists, including wilderness, wildlife, and old-growth forests.

Ministry staff suggest that there are strong indications that public interest in seeing old-growth, especially in the form of tall and large trees, is very high and growing at the present time. Therefore, in this ministry's role on the Environment and Land Use Committee of Cabinet, support for the protection of certain old-growth stands can be anticipated.

(b) Private Funding Agencies

Of the various agencies that have been involved directly in the acquisition for conservation purposes of natural areas of significance, two stand out as offering strong support for old-growth protection. These are the Nature Trust of B.C. and

the Nature Conservancy of Canada. These agencies are both concerned with the need to retain old-growth forests, although they must also contend with a long list of potential acquisitions of natural significance.

As examples, the Nature Trust has recently assisted with the addition of land to Robson Bight Ecological Reserve and the Nature Conservancy has acquired Brackman Island near Sidney, both as sites of undisturbed vegetation. Often such agencies serve a vital role in acquiring lands from private ownership within a tighter response time frame than government. Often such properties are later entrusted (or leased) to government or non-government agencies for management. Despite their interest in protecting old growth forests, these agencies may only be capable of acquiring relatively small sites, given that extremely high acquisition costs, well in excess of their typical expenditures, would usually be required to purchase large old growth forest areas.

4. SUMMARY OF CAPABILITIES OF PROTECTING OLD-GROWTH FORESTS

The purpose of this section is to provide a summarized comparison of the various statutes and mandates reviewed in the preceding section of this paper. This is accomplished by the accompanying table.

Table 3 is intended to be self-explanatory and able to stand alone from this paper. Some columns are accompanied by explanatory legends where appropriate. It is emphasized that the assessments are the author's interpretation of available information.

From this analysis, the following conclusions are apparent to the author:

(a) There is a considerable array of statutes, mandates, and associated institutional mechanisms available for protecting old-growth. In other words, the amount of old-growth that is or might be protected is not limited by the availability of suitable statutes, designations, or mandates.

(b) No single administrative tool that could protect old-growth can serve all the objectives for old-growth protection.

(c) A coordinated effort among the various agencies toward the goal of protecting adequate amounts of old-growth forest could result in more effective overall protection and management to meet the range of objectives.

(d) The Forest Act and the Land Act stand out as offering excellent opportunities for the reservation of old-growth areas from forestry and other uses, at least on an interim basis until more formalized and protective designations can be established over the reserved areas.

(e) For long term protection of old-growth, the Ecological Reserves Act, the Park Act, the National Parks Act (and the West Coast National Park Act, within the existing boundaries), and the Wildlife Act offer the best opportunities for long term protection, each in accordance with specific objectives. Of these, based upon consideration of direct applicability of mandates and the likelihood of further application of these statutes over substantial areas, the first two of these Acts seem to

hold the greatest potential for protection of old-growth. However, much depends upon the priorities of the agencies themselves.

* * *

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TABLE 3: COMPARISON OF STATUTES AND MANDATES AVAILABLE F

1	2	3	4	5	6
STATUTES & MANDATES	AGENCY RESPONSIBLE	LAND DESIGNATIONS	LEVELS OF PROTECTION	OLD-GROWTH PROTECTION OBJECT PRIMARY	OTHERS POSS
Canada Wildlife Act	Cdn. Wildlife Serv. Wildlife Br., NoE	National Wildlife Areas	federal legislation; areas estab. by O-i-C's, supported by regulations.	B, C, E, F	A, D, G, H,
Ecological Reserves Act	Min. of Parks	Ecological Reserves	exclusive legislation; areas estab. by O-i-C's, supported by regulations & management plans.	A, B, E, F.	C, D, G, H,
Environment and Land Use Act	E.L.U.Committee; delegated agency	Wilderness Conservancy	estab. by O-i-C; only one area	A, H, K.	B, C, D, E, G, I, J, L
Fisheries Acts	Dep't. of Fish.& Oceans; Rec. Fisheries Br., NoE; Aquaculture & Comm.Fish.Br., Min. of Agriculture & Fish.	none	overriding regulations; management guidelines	B	E, F, G, H K, L.
Forest Act	Min. of Forests	1 = Wilderness Areas 2 = recreation sites	1 & 2: estab. by O-i-C's; supported by regulations & management plans.	1 & 2: H, J	1: A, B, C G, I, K 2: B, F, K
Greenbelt Act	Min. of Crown Lands	greenbelt lands	development limitations	J, H.	B, C, F, G
Heritage Conserv. Act	Cultural, Recreation, & Historic Res. Br., Min. of Municipal Affairs	1 = archaeological sites 2 = heritage sites	1: automatic protection. 2: estab. by O-i-C, supported by regulations, management plans.	K	E, F, H, J
Land Act	Min. of Crown Lands	1 = O-i-C Reserves 2 = Map Reserves/notations 3 = Designated/Prohibited Use 4 = Transfer to other admin.	1: estab. by O-i-C; management guidelines. 2: estab. by management. 3 & 4: ministerial order	All, except L.	May depend objective agency req the design
Migratory Birds Convention Act	Cdn. Wildlife Service	Migratory Bird Sanctuaries	estab. by fed. O-i-C.	C	A, B, D, E J, K, L.
National Parks Act & West Coast Nat'l Park Act	Parks Canada	1 = National Parks 2 = Nat'l Park Reserves	estab. by exclusive legislation, supported by regulations, management plans.	A, B, H, I, J, K	C, D, E, F
Park Act	Min. of Parks	1 = Parks, Class A	may be defined in legislation; O-i-C's; regulations; management plans.	A, B, H, I, J.	C, D, E, F
		2 = Parks, Class B & Recreation Areas.	estab. by O-i-C; supported by regulations and plans	A, B, H, I, J.	C, D, E, F L.
Park (Regional) Act	regional districts	regional parks & trails	O-i-C; bylaws; management plans	H, J	A, B, C, I I, K, L.
Water District Acts	water boards of Victoria. Vancouver, & Nanaimo	water districts	estab. by separate legislation; governed by management plans.	L.	A, B, C, G, K.
Wildlife Act	Wildlife Br., NoE	1 = Wildlife Management Area; 2 = Critical Wildlife Area; 3 = Wildlife Sanctuary.	estab. by O-i-C's; supported by regulations & plans.	B, C, E, F.	A, B, G,
tourism promotion	Ministry of Tourism	none	none	H, I, J	A, B, C, K, L.
private conservation foundations/funds	eg: Nature Trust; Nature Conservancy.	fee simple lands; leases to management agencies.	private ownership guided by nature conservation objectives.	A, B, C, D.	E, F, J,

7	8
MANAGEMENT OPTIONS AVAILABLE TO AGENCY	ASSESSMENT OF CAPABILITY TO PROTECT OLD-GROWTH
1, 2, 3, 5, 6.	limited; focus on non-forest areas; few sites.
1, 2, 3, 5, 6.	high in theory; subject to consent from other agencies.
2, 3, 4, 5, 6.	moderate in estab. areas; further application seems unlikely.
2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	low; limited ability to maintain forests in undisturbed condition.
2, 3, 4, 5, 6, 7, 8, 9, 10.	high; due to authority over all crown forests; ability to reserve forestlands from forestry.
2, 3, 4, 5, 6, 7, 8, 9.	low; lack of acquisition funds; focus on near-urban lands.
2, 3, 4, 5, 6, 10	low; small sites & preference for human history only.
1, 2, 3, 4, 5, 6, 7, 9, 10	mod. to high; usually interim means of holding lands from other uses.
1, 2, 3, 5, 6	low; focus on non-forest areas, small sites.
2, 3, 7, 9.	high where established; difficult to create new or add to existing parks.
2, 3, 6, 7, 9.	high; exclusiveness of statute; strong public support.
2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.	moderate; subject to existence of conflicting tenures.
2, 3, 4, 5, 6, 7, 9.	low; lack of opportunity near urban areas.
1, 2, 6, (8 & 12)	low to moderate; unlikely to be expanded; subject to existing tenures.
1, 2, 3, 4, 5, 6, 9, 11.	moderate to high; designations have not been widely applied as yet; statute can also be used to modify industrial activities to protect wildlife values.
not applicable	low; support role only for conservation of sites with high public appeal/attraction.
1, 2, 3.	moderate; ability to acquire private lands in timely manner; sites are free of the risk of changing government policy; funds must be used very judiciously.

KEY TO PROTECTION OBJECTIVES (COLUMNS 5 & 6)

- A: Ecosystem Preservation
- B: Preservation of Special Flora & Fauna
- C: Protection of Associated Wildlife Habitat
- D: Protection of Freshwater Fish Habitat
- E: Opportunities for Nature Conservation Research
- F: Opportunities for Education
- G: Forestry Research
- H: Opportunities for Outdoor Recreation
- I: Tourist Destination Opportunities
- J: Spiritual/Aesthetic Values Protection
- K: Historical/Archaeological Values Protection
- L: Conservation of Water Resources

KEY TO MANAGEMENT OPTIONS (COLUMN 7)

1: Absolute nature sanctuary
2: Observational research/study
3: Dispersed recreation/public visitation
4: Wild foods gathering
5: Manipulative research
6: Genetic materials extraction
7: Intensive recreation
8: Mineral and other geophysical surveys
9: Roads and roadbuilding
10: Dispersed habitation
11: Selected cut forestry
12: Rotational clear cut forestry
13: Total forest removal

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